

CLAIMS

1. A method of manufacture of a substantially nugget-free cheese comprising:
 - (a) dispersing in milk or water or other aqueous solutions a dried HY-MPC having at
5 least 55% SNF as milk protein;
 - (b) treating the resulting mixture with one or more coagulating enzymes to produce a curd; and
 - (c) processing the curd to make cheese
- 10 wherein the dried HY-MPC is a MPC or MPI having whey proteins denatured to allow whey proteins to be incorporated into cheese in higher yield than the resulting yield when the corresponding MPC or MPI without denaturation of whey proteins is used and wherein the dried HY-MPC is a calcium depleted milk protein product and
15 the extent of calcium depletion is sufficient to allow the manufacture of substantially nugget-free cheese.
2. A method as claimed in claim 1 wherein the dried HY-MPC has at least 70% SNF as milk protein.
- 20 3. A method as claimed in claim 1 or claim 2 wherein the HY-MPC product has a solubility higher than that of the MPC or MPI without calcium depletion.
4. A method as claimed in claim 3 wherein at least 40% of the HY-MPC is cold soluble.
- 25 5. A method as claimed in any one of claims 1-4 wherein the cheese undergoes further processing to produce a processed cheese or a processed cheese product.
6. A method as claimed in any one of claims 1-5 wherein cheese comprises 50 to 100% of the total whey proteins from the HY-MPC.
- 30 7. A method as claimed in any one of claims 1-6 wherein the HY-MPC has been prepared using heating for 4-15 minutes at greater than 100°C.
8. A method as claimed in any one of claims 1-7 wherein the HY-MPC has 85% dry
35 matter as milk protein, and a calcium depletion of 30 to 100%.

9. A method as claimed in any one of claims 1-7 wherein HY-MPC has 70-80% dry matter as milk protein and the calcium depletion is 20-100%.
10. A method of cheese manufacture which includes the step of adding a 10-100% calcium depleted HY-MPC to milk containing fat or any other aqueous solution used as the starting material.
11. A method of cheese manufacture comprising:
- (a) dispersing in milk a dried HY-MPC having at least 70% SNF as milk protein;
- (b) treating the resulting mixture with one or more coagulating enzymes to produce a curd, and
- (c) processing the curd to make cheese;
- wherein the dried HY-MPC is a MPC or MPI having whey proteins denatured to allow whey proteins to be incorporated into cheese curd in higher yield than the resulting yield when the corresponding MPC or MPI without denaturation of whey proteins is used and wherein the dried HY-MPC is a calcium depleted milk protein product and the extent of calcium depletion is 30-100%.
12. A method for preparing a dried enhanced-solubility, and high denatured whey protein content HY-MPC product comprising:
- (a) providing an ultrafiltered skim milk or whole milk, or buttermilk, or any other aqueous protein solution, in the form of an aqueous solution/suspension having at least 70% SNF as milk protein;
- (b) removing 20-100% of calcium ions therein by a method chosen from at least one of
- (i) cation exchange on an ion exchanger in the sodium and/or potassium or hydrogen form,
- (ii) acidification to pH <7 with subsequent dialysis and/or ultrafiltration and/or diafiltration, or
- (iii) by addition of chelating agent; and/or binding a proportion of calcium ions with a chelating agent;
- (c) heating the solution at a temperature and for a time sufficient to allow

- denaturation of whey proteins and interaction with casein,
(d) drying to prepare a dried product;

wherein after step (b) the pH of the solution is adjusted if necessary so that the heating at step
5 (c) is carried out on a solution having a pH of 6.0-7.0,

13. A method as claimed in claim 12 wherein after step (b) or (c) the pH of the solution is adjusted if necessary so that the heating at step (d) is carried out on a solution having a pH of 6.5-7.0.

10

14. A method as claimed in claim 12 or claim 13 wherein the high denatured whey protein content is a content such that the whey protein content of curd produced on treatment with coagulating enzymes is 50-100% of the whey protein from MPC.

15 15. A method as claimed in any one of claims 12-14 wherein step (b) is carried out by cation exchange on an ion exchanger.

16. A method as claimed in any one of claims 12-15 wherein the product from step (b) is mixed with another milk or other aqueous protein solution while maintaining at least 30%
20 calcium depletion.

17. A method as claimed in any one of claims 12-16 wherein the heated solution from step (c) is concentrated by evaporation prior to step (d).

25 18. A method for manufacture of milk protein product comprising at least 70% milk protein with high denatured whey protein content comprising:

a) providing an ultrafiltered skim milk or whole milk, butter milk, or any other aqueous protein solution, in the form of an aqueous solution/suspension with at least
30 70% SNF as milk protein,

(b) removing at least 30% of the calcium content,

(c) denaturing whey proteins in the calcium depleted product by heating the solution at pH 6.0-7.0 at a temperature, and for a time sufficient to allow denaturation of whey proteins, or by applying an ultra high pressure treatment,

23

(d) drying to prepare a dried product with a denatured whey protein content approximately the same as the whey protein content of skim milk.

19. A method as claimed in claim 18 the denaturation of whey proteins is achieved by a
5 treatment or combinations of treatments selected from :
direct steam injection;
indirect heating using for plate heat exchangers;
ohmic heating;
microwave heating; and
10 ultra high pressure treatment; and
alkali treatment followed by neutralisation
20. A method as claimed in claim 18 wherein the denaturing is by a heat treatment.
- 15 21. A method as claimed in claim 20 wherein the heat treatment is by heating the solution at pH 6.0-7.0 at a temperature, and for a time sufficient to allow denaturation of whey proteins.
22. A method as claimed in claim 20 or 21 wherein the heating is indirect heating.
20
23. A method as claimed in any one of claims 18-22 wherein the product from step (b) is mixed with another milk or other aqueous protein solution while maintaining at least 30% calcium depletion.
25
24. A method as claimed in any one of claims 18-23 wherein the product of step (c) is concentrated by evaporation prior to step (c).
25. A dried HY-MPC having 20-100% depletion of calcium.
30
26. A dried HY-MPC as claimed in claim 24 wherein the percentage calcium depletion is 30-100%.